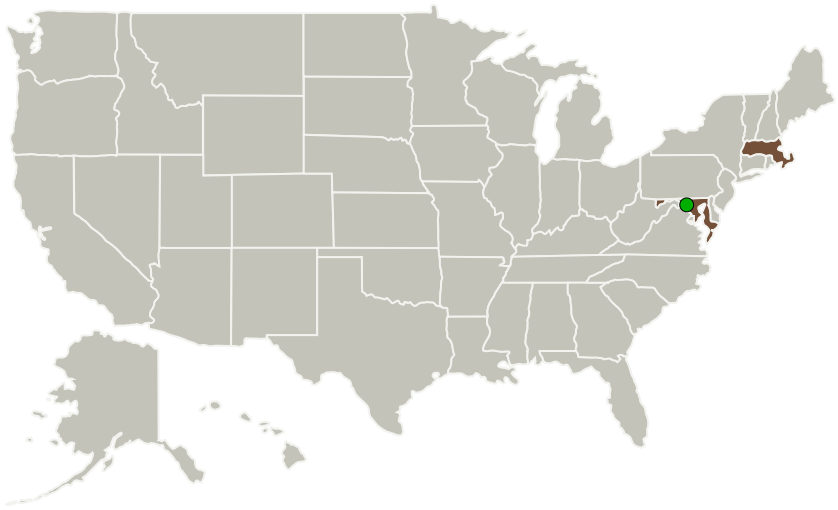
Advanced Onboard Energy Storage Solution for Balloons, Phase I

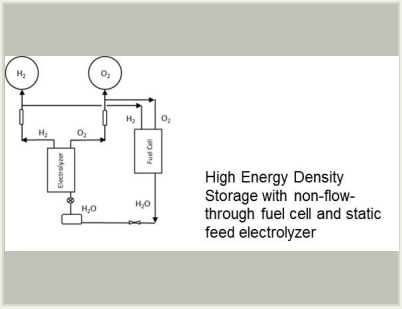
Completed Technology Project (2015 - 2015)

Project Introduction

Advanced Balloon Programs at NASA are looking for a potential 100 day missions at mid-altitudes. These balloons would be powered by solar panels to take advantage of the power generated by sun. But during these long duration flights there is a potential of having 12 hours or more of darkness. It becomes critical that there is an energy system on board which can take advantage of excess solar power and store it for the use during darkness. Since these are mid-altitude space crafts, the weight, reliability, and safety are all important criteria for selecting the right technical solution. In the Phase I project, we propose to use a novel Regenerative Fuel Cell (RFC) system combing non-flow-through fuel cell stacks based on ElectroChem's patented Integrated Flow Field (IFF) design and static-feed electrolyzers. This novel RFC system passively moves water and gas flow in a closed cycle and promises an advanced system to be compatible for gravity independent operation and significantly minimize the needs of ancillary components and parasitic power. This RFC system provides the solution on the system level to reach high system specific energy density by elimination of BOP components and reach 400 to 450wh/kg

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
ElectroChem, Inc.	Lead Organization	Industry Minority-Owned Business, Women-Owned Small Business (WOSB)	Woburn, Massachusetts
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Transitions

June 2015: Project Start

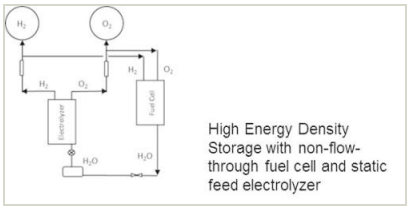
December 2015: Closed out

Closeout Summary: Advanced Onboard Energy Storage Solution for Balloons, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138789)*

Images



Briefing Chart Image
Advanced Onboard Energy Storage Solution for Balloons, Phase I *(https://techport.nasa.gov/image/136256)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
ElectroChem, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

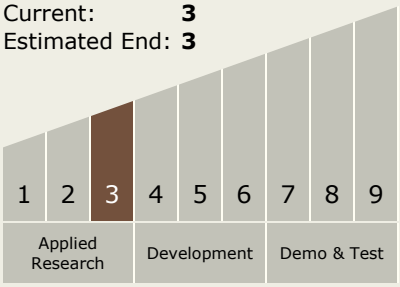
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Shyhing Pien

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.4 Dynamic Energy Conversion

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System